July 1992 A Cahners Publication

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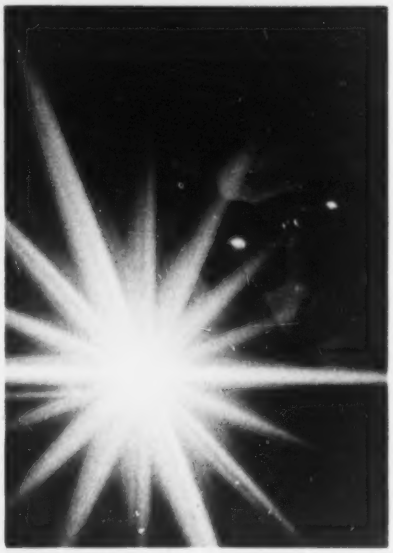

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R&D

The International Magazine of Research and Development

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ABOUT THE COVER Aniline-blue stained cross section of an asparagus root at 25× using fluorescence was made by Mark Brundrett at the Soil Science and Plant Nutrition Center, Univ. of Western Australia. Photo: Nikon. *See article, page 32.*

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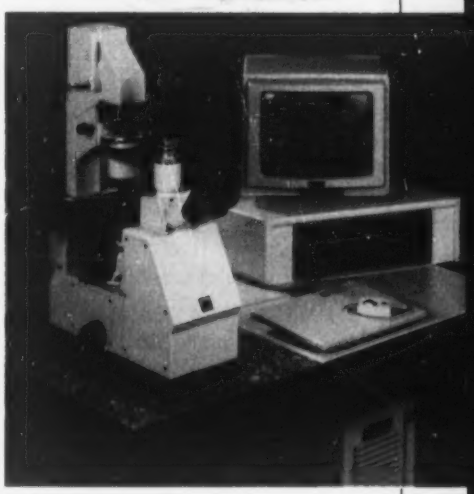
MICROSCOPY

Add Video to Your Microscope For Even Better Imaging 32

By enhancing your optical microscope with a video system, you'll get much more information from your specimens.



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Raman spectroscopy may be worth another look because of dedicated instrumentation and a host of exciting new applications.

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Do Your Homework Before Choosing a Cryopump 67

First, calculate your gas pumping requirements precisely. Then check out these new pumps from Semicon/West.

Parallel Computing Market Emerging

High-performance computing is the second fastest growing computer area today with more than $27 billion in sales in 1991. It trails only network computing, according to a recent study by Electronic Trends Publishing (ETP), a Saratoga, CA, market research company.

Within high-performance computing, parallel systems are growing faster than all the rest, including conventional vector-multiprocessor and scalar/vector systems.

Not surprisingly, the two biggest names in high-performance computing, Cray Research and IBM, have recently announced plans to develop commercial parallel systems. Cray is developing a system that could consist of as many as 1,024 microprocessors, with first versions available as early as 1993. Cray's system will use Digital Equipment's new Alpha microprocessor for each node.

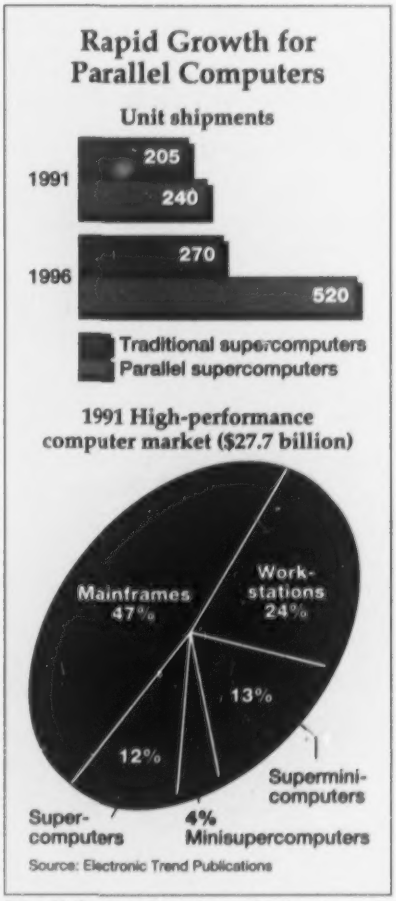
IBM's system is based upon its RISC (reduced instruction set computing) technology. Program managers for both systems are setting their sights on obtaining 1 teraFLOP performance within the next several years.

Oddly enough, applications for parallel computing are extending beyond traditional scientific areas, as more businesses begin to use this approach to sift through huge amounts of data. American Express, for example, uses its parallel computer to support its travel services business, and Kmart uses its parallel machine to develop new marketing strategies.

Software problems concerning how to coordinate all of a parallel machine's microprocessors remain the largest obstacle to large-scale applications. Each program still needs to be individually developed.

For additional information on parallel computing, see Justin Rattner's (Intel) feature article elsewhere in this issue. For more market information, ETP's report, *Parallel Processing/High Performance Computing—A Strategic Market Assessment,* ($1,500) is available by calling 408/996-7416.

—Tim Studt



Parallel computers have the best growth in the high-performance computing market, with twice as many units forecast to be sold in 1996 as in 1991.

Economics Slow Japanese R&D

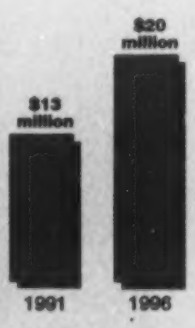
The slowdown in Japan's economy is hitting R&D spending. Corporate earnings in fiscal 1991 are thought to have declined for the first time in the last 10 years, and the current fiscal year is expected to be even worse.

The economy entered a recession in the last quarter, and predictions as to when it will pick up are mixed. While Japanese companies try to maintain R&D spending even in a downturn, the rate of spending growth is slowing.

According to a survey by Nihon Keizai Shimbun, a newspaper publisher, the estimated increase in R&D spending by manufacturers in the fiscal year through March 31 was 9.5%. Through the late 1980s, R&D spending went up 12% or more annually.

"R&D will go up a little with salary increases, but we won't see equipment budgets expanded in this fiscal year," says Steven Myers, a high technology

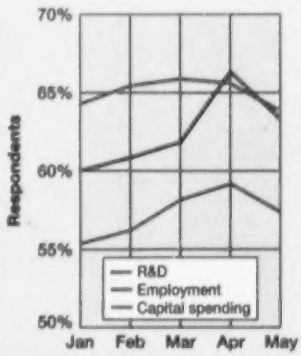
Renewed Interest in Raman



The market for dedicated Raman instruments and FTIR spectrophotometers with Raman accessories is forecast to grow 9% annually to more than $20 million in 1996, according to Strategic Directions Intl., a Los Angeles-based consulting firm.

Although the current market for Raman instruments is small, use in areas other than research is driving this growth, says SDI.

Confidence Softens



Executives' confidence in their ability to maintain business efforts over the next few months softened in May, according to Cahners Economics (CE), Newton, MA.

This doesn't mean overall economic conditions will soon decline, says CE. More than half the firms rate current conditions as good—the same number as in April.

stock analyst with Tokyo-based Jardine Fleming Securities Ltd. But, a wholesale cutback is not expected either, according to Myers.

In a report to the Japanese prime minister, the Council for Science and Technology, an advisory body, called for the government to double spending on R&D and to strengthen basic research at Japan's universities and research institutes. *—Dennis Normile*

Law Slows Clinical Instrument Growth

Confusion over the U.S. Clinical Laboratory Act of 1988 (CLIA 88) has dramatically slowed growth in the once-thriving clinical lab instrument market, according to a recent study by Market Intelligence Research Corp., a Mountain View, CA, marketing research firm.

CLIA 88 placed stringent new regulations on laboratories concerning quality assurance standards, proficiency testing, and personnel guidelines. All this has caused users to postpone new instrument purchases until uncertainties about the new rules are resolved.

However, the new law also sped development of new instruments with higher throughput rates, greater reliability, accuracy, and ease of use. New lower-cost analytical instruments for checking body fluid chemistry incorporate various technologies to maximize output.

For a copy of the study ($1,895), call 415/961-9000. □

Sales of clinical laboratory instruments are increasing about 5.5% annually, down from nearly 7% in 1988 before new regulatory laws took effect.

Industry, Academia Must Work Together

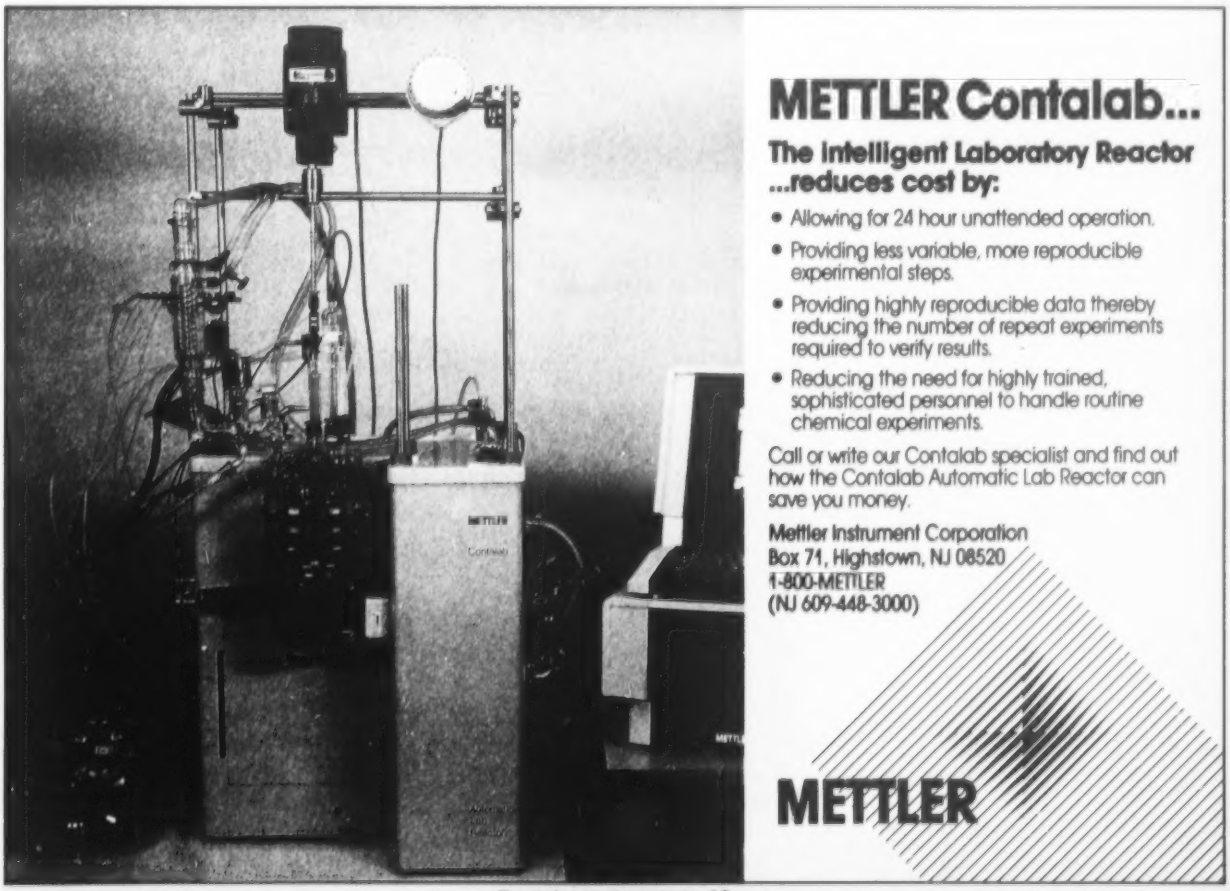
Transferring technology from the campus to the marketplace is key to staying competitive in the global market, says Dorin Schumacher, an administrator at Purdue Univ., West Lafayette, IN.

"Many countries, such as Japan and Germany, already know how to transfer technology from academia to industry," she says. "The countries that will be successful competitors will be those that are best able to move ideas from the lab to the marketplace."

In her new book *Get Funded! A Practical Guide for Scholars Seeking Research Support from Business*, Schumacher advises researchers on how to form partnerships with industry.

"While federal funding for university research is clearly defined, the path between industrial funding and universities is obscure," says Schumacher. Additionally, federal research funding is becoming harder to obtain, so researchers increasingly are seeking relationships with industry as a means of obtaining funding.

Schumacher's book ($18.95) is available from Sage Publications Inc., Newbury Park, CA. **R&D**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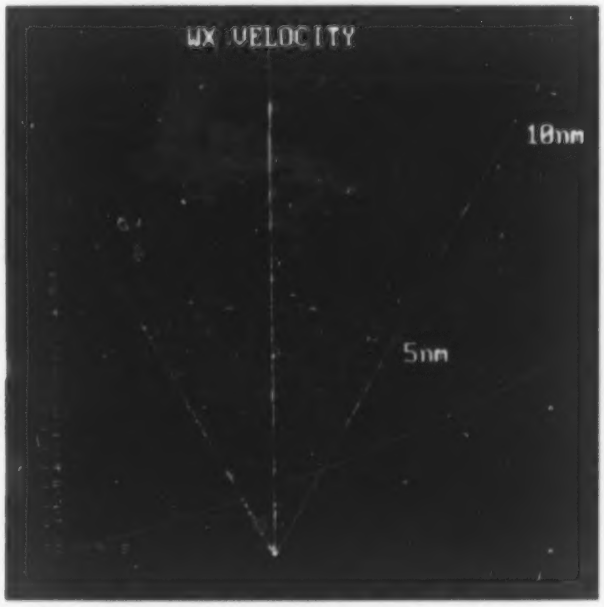
Windshear Detection Advances

Interest in developing new technologies for windshear detection and avoidance is growing fast. One incentive is the potential multibillion dollar market that will result from U.S. Federal Aviation Agency regulations requiring airlines to install such equipment by the end of 1993.

The FAA guidelines stem from the desire to avoid tragedies such as the 1987 crash of a Delta Airlines jet trying to land at Dallas-Fort Worth Airport.

A major question is whether such systems should be "reactive" or "predictive." In the past, available designs have been reactive types, which signal the flight crew that an aircraft has entered a windshear region.

Unveiled at the recent Asian Aerospace '92 Show in Singapore were some of the first predictive formats, such as the Windshear/CAT Prediction System from Rosemount Inc.'s Aerospace Div., Eden Prairie, MN, and the RDR-4B forward-looking detection and avoidance system under study at Allied-Signal Aerospace's Bendix/King Air Transport Avionics Div., Fort Lauderdale, FL.



***This windshear detection system** from Bendix/King shows relative speed of radar returns with respect to the ground. Negative velocities indicate movement toward the aircraft .*

The Rosemount system is a forward-looking passive infrared (FLIR) sensing system that measures air temperature and water vapor concentration in front of an aircraft to determine whether windshear or significant clear air turbulence is imminent.

The Bendix/King concept is radar-based. Company engineers told *R&D* the system essentially is an upgrade of the RDR-4A weather radar system, with an advanced microprocessor and new antenna. The system penetrates weather systems and detects windshear phenomena, also called "microbursts," in rain at altitudes under about 2,500 ft.

Near the ground, a downward-moving microburst splits into two wind flows, one accelerating toward the airplane, the second in the other direction.

"Doppler technology is used to measure the difference between the accelerations of the winds moving in opposite directions," says Ron Carlson of Bendix/King. "If a microburst is detected, a warning [of two to three minutes] is given to the pilot." Colors on the radar display show whether the hazard is mild (green), medium (yellow), or severe (red).

Bendix/King's designers claim their system is much more effective than alternatives such as FLIR and the Doppler-based technique called LIDAR. And retrofitting FLIR, they say, requires cutting a hole in the fuselage to mount the sensor.

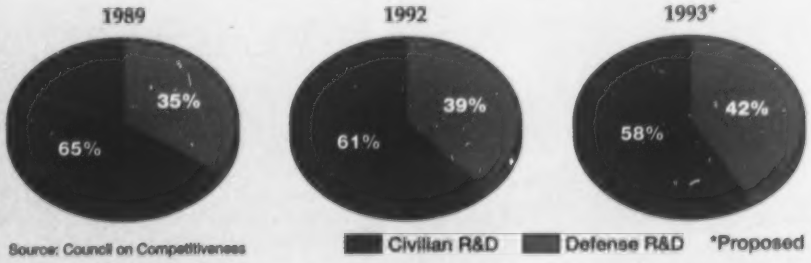
But a problem with the radar approach is that if a microburst occurs directly in front of the plane, the radar won't see it. While that isn't likely to happen very often—microbursts in general aren't very common—it is something the FAA must mull over. As Carlson noted, "The question remains: If an operator has a predictive system, will he also need a reactive one?"

By the same token, until now the reactive systems have had the field to themselves. So it might also be asked, If an operator has reactive, does he also need predictive?

Both approaches have advantages and disadvantages. Rosemount engineers agree that in the future, combined reactive/predictive systems may prove the most attractive option for airlines. *—Irwin Stambler*

Civilian R&D Takes Larger Piece of Federal Pie

(Percent of U.S. fiscal year budget)



***The proposed fiscal year** 1993 budget for U.S. federal R&D spending continues the trend toward more for civilian R&D and less for defense R&D.*

R&D SOFTWARE

Thermal Image Analysis

ERIKA 2.0, a new software version for the company's Thermovision 900, adds a "thermal workstation" designed for scientists and engineers performing advanced research and quality control. It allows the plotting of time vs. temperature for up to three points on an image.
Agema **Circle 342**

FT-IR Spectral Searches

Model 1650 FT-IR Spectrometer is a revised version of the company's 1600 Series. The new software has spectral interpretation and searching features. The revised software also provides the ability to select among peak match, interpretation, EXPERT, and Euclidian distance algorithms.
Perkin-Elmer **Circle 343**

EZChrom Upgrade

EZChrom Version 1.1 is a software upgrade of the company's EZChrom Chromatography Data Acquisition and Control System. It includes compatibility with the LC and the GC chromatograph control packages. Features include: bracketing calibration functions, new append function for batch operations, extensive real-time feedback, improved printing speed, and user log-in and audit trail.
Shimadzu **Circle 344**

Real-Time DSP Support

LabWindows Version 2.2 is a development system for DOS-based data acquisition and instrument control applications. The software now features enhancements to the analysis libraries for real-time digital signal processing, the User Interface Library for interactive graphics, and to the data acquisition library for support of the SCXI signal conditioning system.
National Instruments **Circle 340**

Environmental Analyses

The Enviropro software for the company's Saturn II GC/MS systems performs multiple calculations automatically and generates report forms similar to the EPA CLP 3/90 statement of work (SOW). It also verifies that EPA mass spectral tuning criteria of BFB and DFTPP are met.
Varian Associates **Circle 341**

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